Enterprise Energy Information Systems and Management

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14. ABSTRACT

Recognizing that energy is a strategic resource, the Department of the Navy has set aggressive energy goals to achieve our objectives. At the same time, we must meet a multitude of federal energy laws designed to decrease our dependence on fossil fuels. The Navy?s Shore Energy Strategy is to assure our energy security while meeting our goals and legal requirements by focusing on energy efficiency; transforming our culture and behavior; and integrating sustainable infrastructure and viable renewable energy systems. The Naval District Washington (NDW) working with Commander Naval Installations Command (CNIC) and the Naval Facilities Engineering Command (NAVFAC) has embarked on a series of related projects designed to maximize energy and personnel resources, while leveraging proven new technologies with the goal of achieving significant reductions in energy utilization and provide for enhanced security and responsiveness of the base/installation infrastructure support organization. At the heart of this effort is the Navy?s SmartGrid Pilot Program in NDW being spearheaded by the NDW Regional Chief Information Officer (N6) and the NDW Regional Engineer (N4). The Navy SmartGrid Pilot will bring together the foundational SmartGrid Platform IT technologies, such as Enterprise Industrial Control Systems (EICS), Advanced Metering Infrastructure (AMI), and Virtual Perimeter Monitoring System (VPMS) solutions that NDW has been implementing throughout the Region, along with integration efforts with existing and proposed NAVFAC Business Systems. In addition NDW is expanding the integration of other Shore Platform Systems such as Access Control Systems and the integration of other building automation systems such as lighting control and elevator control systems into an expanded solution called Cognitive Energy Management solutions (CEMS).

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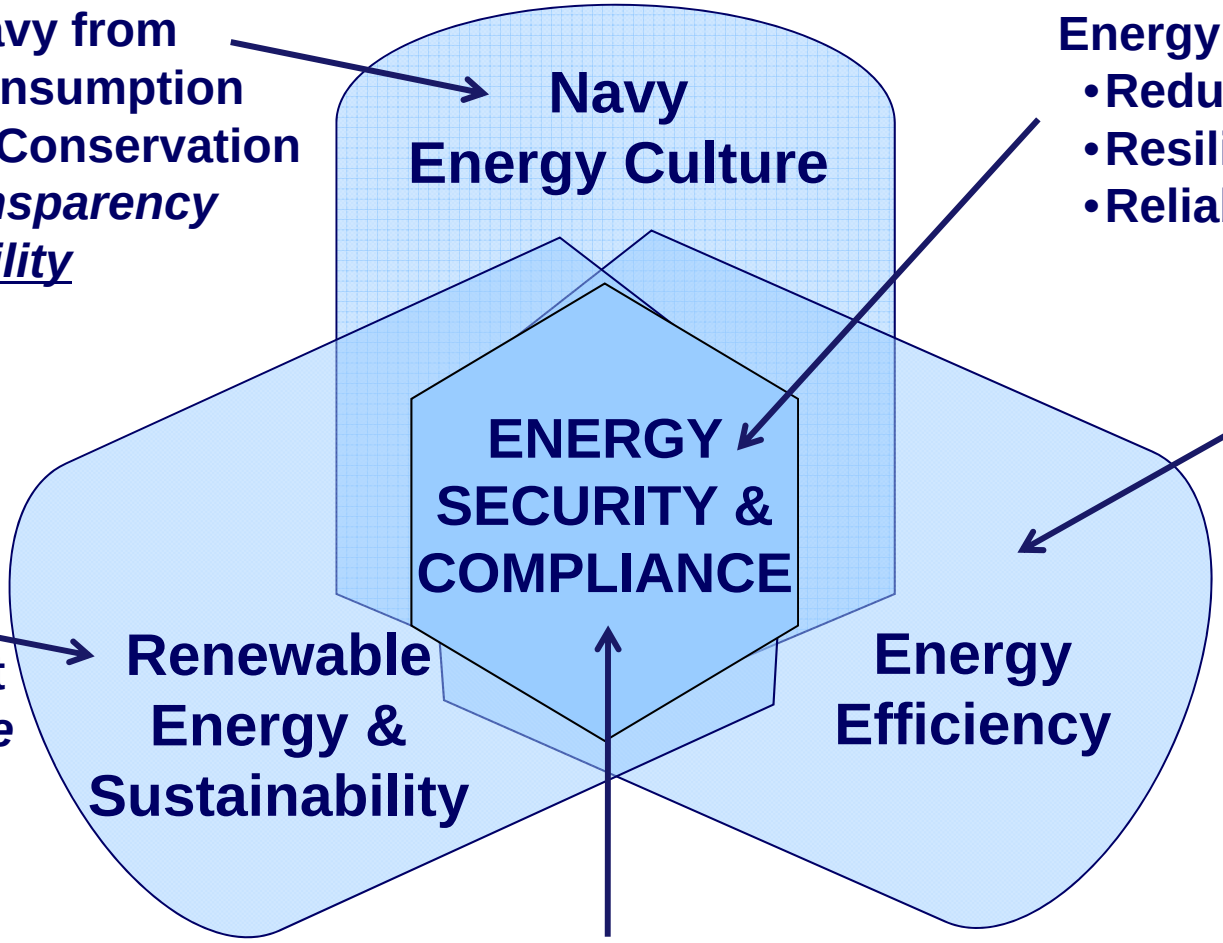
Agenda

1	NDW Shore Energy Strategy/CONOPS
2	Current NDW Pilot Projects
3	Future NDW Pilot Projects
4	Navy SmartGrid Video

Navy Shore Energy Strategy

Transform Navy from Culture of Consumption to Culture of Conservation *Through Transparency & Accountability*



Energy Security:
- **Redundancy**
- **Resiliency**
- **Reliability**

Energy Efficiency First

The *Right Technology* at the *Right Time*
- **Watch**
- **Partner**
- **Lead**

"Compliance" is Unique to the Shore

NDW SmartEnergy CONOPS

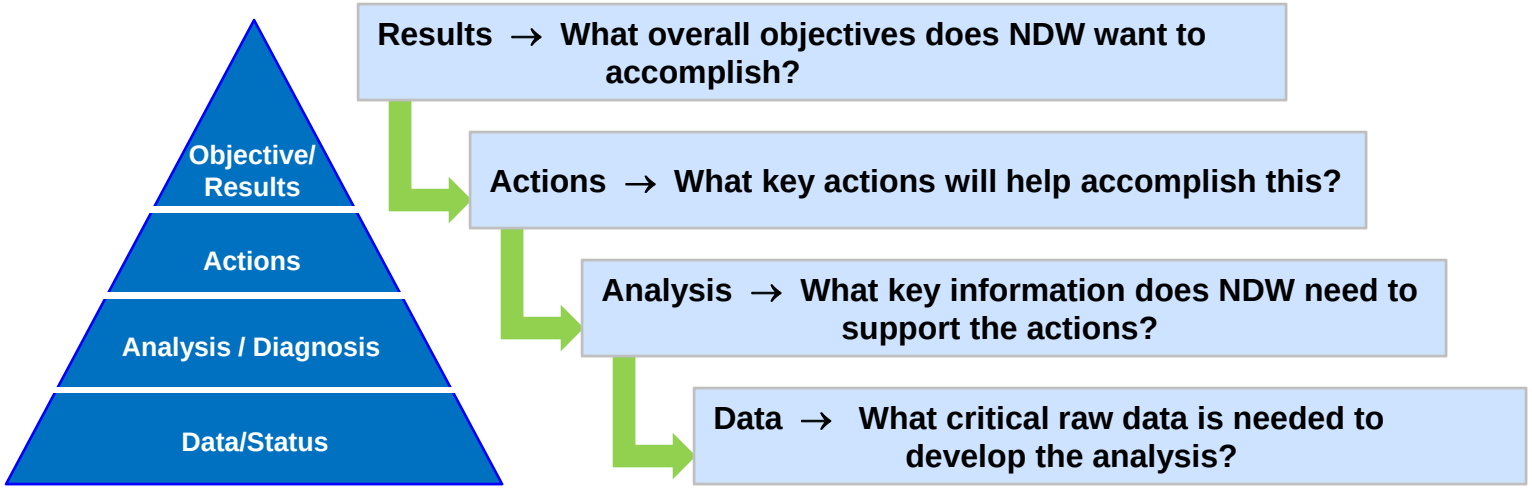
CONOPS

- The NDW SmartEnergy CONOPS defines analysis of collected data to determine appropriate actions in support of the Region's overall objectives.

Objectives

- Reduce ***energy costs*** without impacting mission**,** thereby also reducing energy consumption
- Reduce ***O&M*** costs without impacting mission
- Change ***operational behavior*** regarding energy to allow transparent decisions regarding energy-saving opportunities

Approach

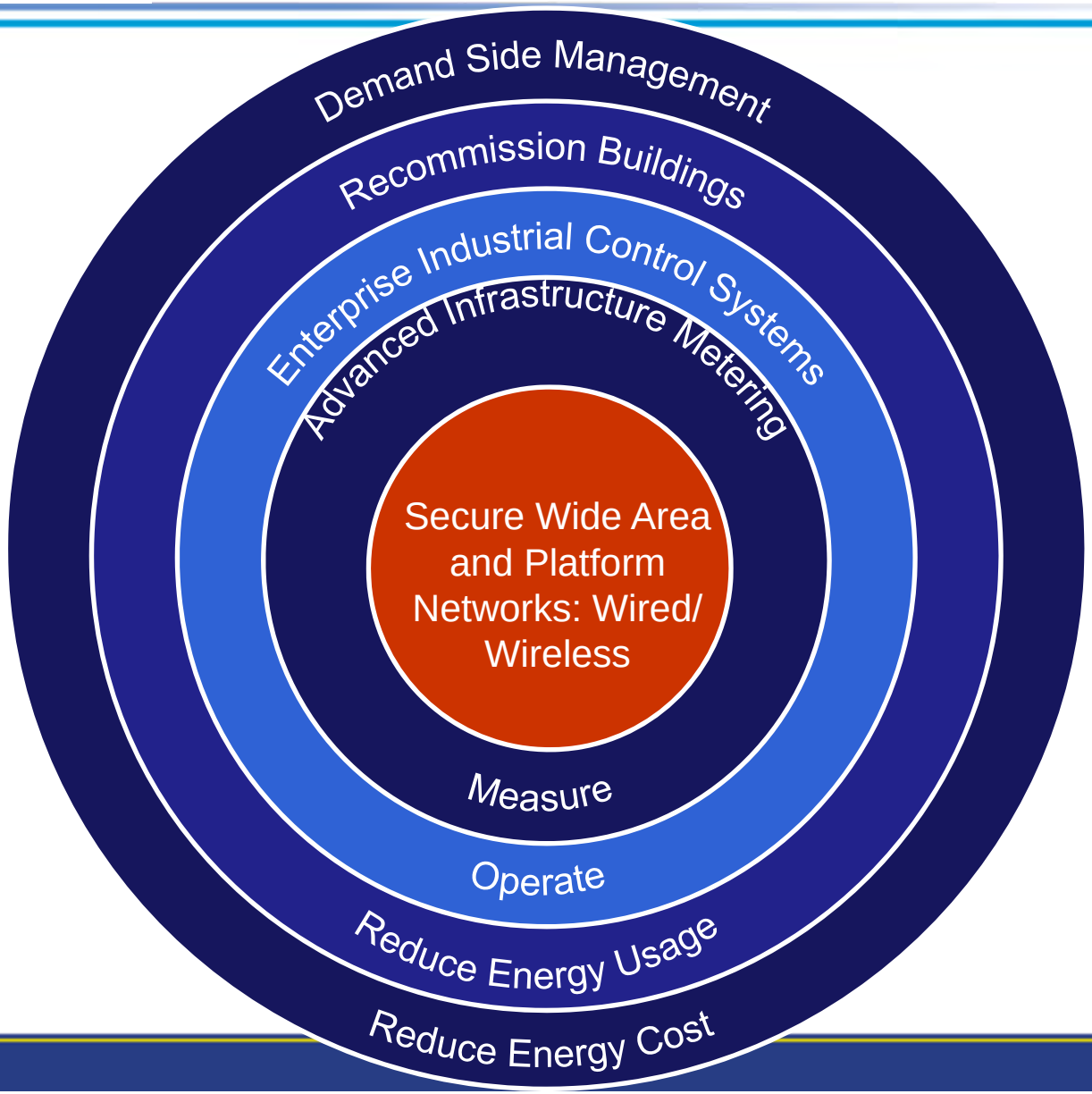


SmartEnergy

The combination of:

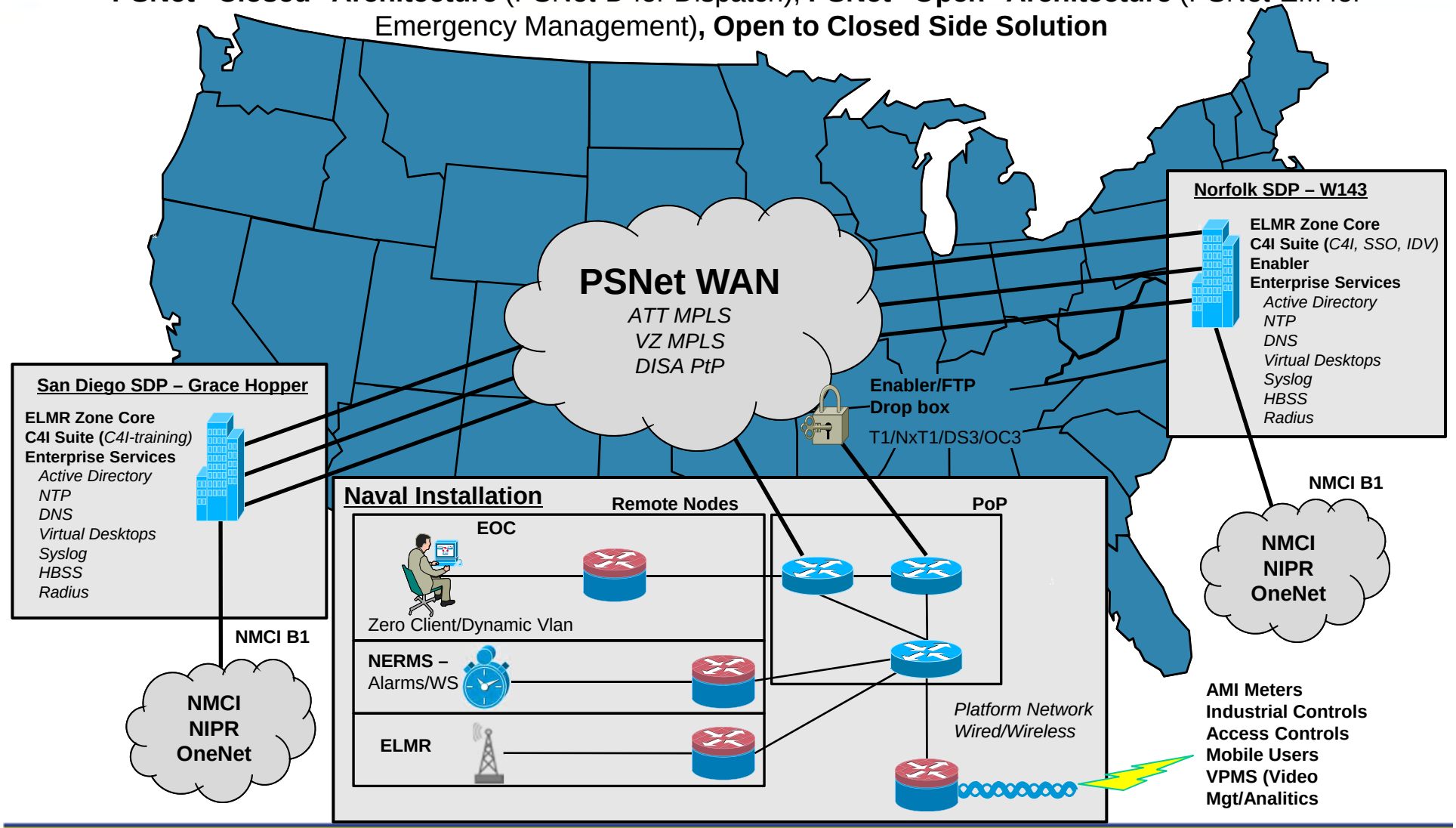
- *SmartMeters, direct digital control (DDC) of HVAC, lighting controls, advanced metering infrastructure (AMI), supervisory control and data acquisition (SCADA) for high-voltage utility components,*
- *Coupled with a robust networked communications backbone,*
- *Allowing enhanced digital control of all aspects of the Region's energy infrastructure.*

NDW SmartEnergy Initial Strategy

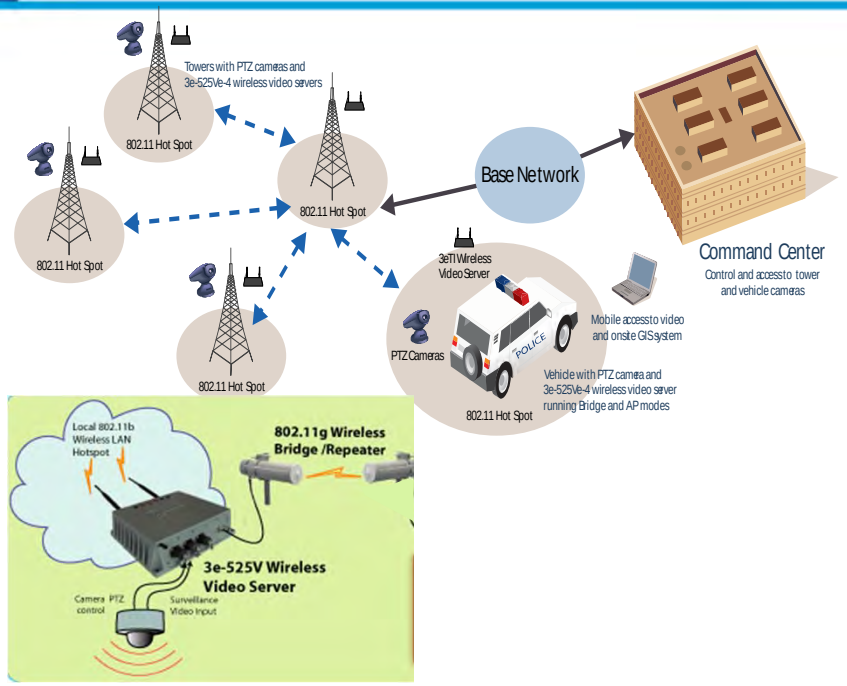


Shore Network Architecture

PSNet "Closed" Architecture (PSNet-D for Dispatch), **PSNet "Open" Architecture** (PSNet-EM for Emergency Management)**, Open to Closed Side Solution**



Sensor Networks and Critical Infrastructure Monitoring & VPMS



- Foundational Wired and Wireless Networking for Sensor Systems
- Critical Infrastructure Protection via wired and wireless sensors for:
  - Military Bases / Federal Campuses
  - Water Towers/Wells, Tank Farms
  - Substations, Wastewater, Pumping Stations

Features

- A “virtual” impenetrable fence that detects and then alerts when intruders enter site
  - Simple, bolt-on, out-of-the-box wireless video surveillance system for protecting critical infrastructure
  - Video analysis and automated intruder detection/alert
- Enhanced monitoring with simultaneous access to multiple cameras/video screens
- Wireless Network for Mobile and Fixed Sites
- Certified, standards-based security
  - DoD/Federal agency compliance to FIPS 140-2 & Common Criteria EAL4
  - Platform IT (PIT) designated and Platform IT Risk Acceptance Approved by NETWARCOM

Deployments

- Naval District Washington (NDW)
- Naval Station Guantanamo Bay
- Network Leveraged for AMI Navy wide

Navy Advanced Metering (AMI)

Northwest (3 sites)
Award Jul 09
1,799 electric meters
323 gas meters
542 water meters
122 steam meters

Midwest (3 sites)
Award Sep 10
467 electric meters
187 gas meters
169 water meters
64 steam meters

Hawaii (3 sites)
PMRF Award Sep 09
Rest of HI Dec 10
741 electric meters
0 gas meters
318 water meters
0 steam meters

Washington (7 sites)
Award Sep 09
1,173 electric meters
6 gas meters
135 water meters
100 steam meters

EURAFSWA (5 sites)
731 electric meters
43 gas meters
100 water meters
65 steam meters

FarEast (5 sites)
1,880 electric meters
0 gas meters
28 water meters
126 steam meters

Midlant (18 sites)
1,635 electric meters
179 gas meters
726 water meters
589 steam meters

Southwest (13 sites)
NBVC Award Sep 08 (Pilot)
Rest of SW Aug 09
2,104 electric meters
520 gas meters
975 water meters
22 steam meters

Marianas (3 sites)
Award Aug 11
554 electric meters
0 gas meters
217 water meters
3 steam meters

Southeast (15 sites)
Award Sep 09
2,461 electric meters
593 gas meters
1,185 water meters
34 steam meters

~71% of meters to be installed are under contract

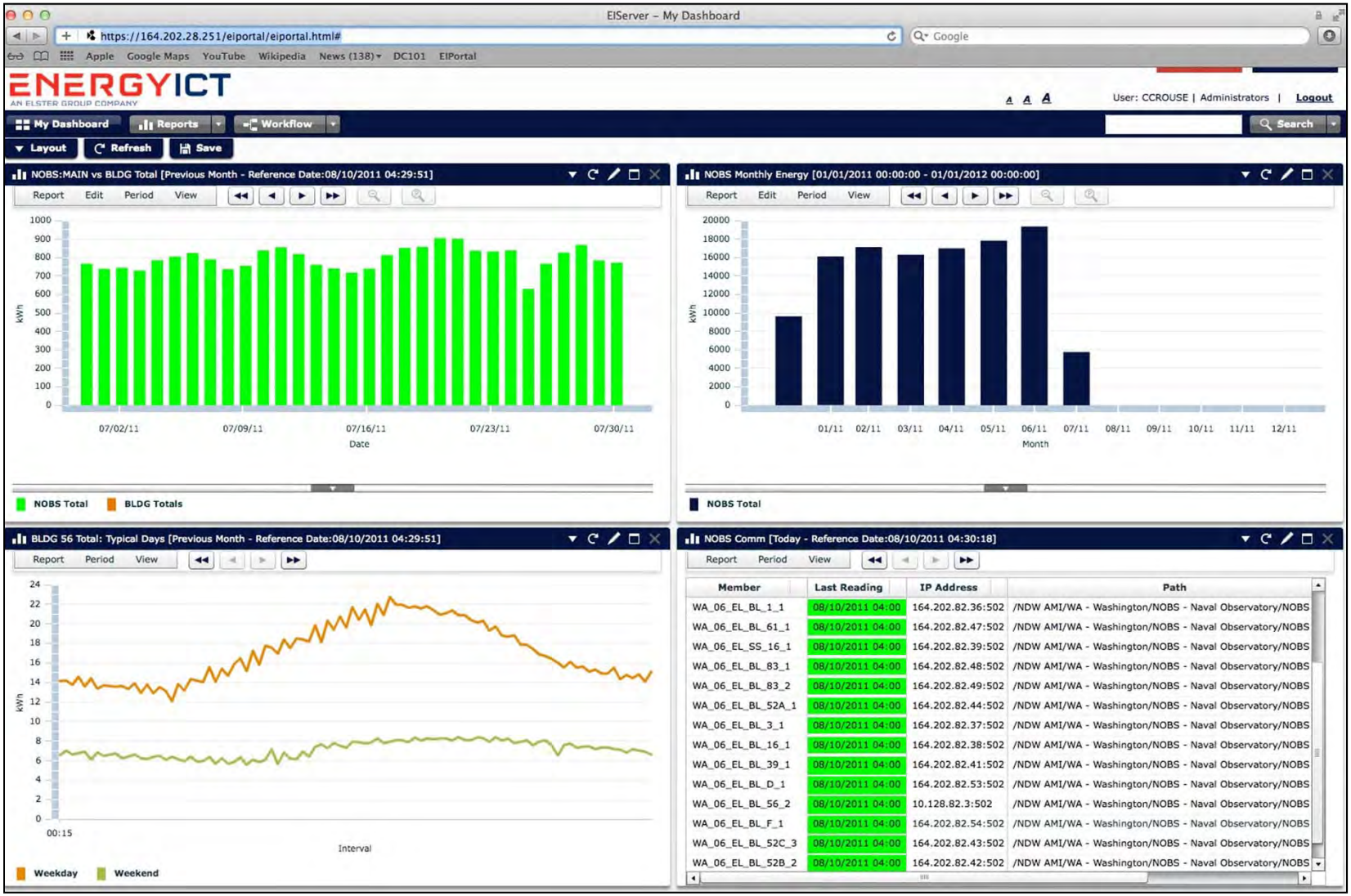
MDM as part of CIRCUITS:
Enterprise metering database, & data analysis tool

Meter Data Management

Metering data from all regional DAS's to the MDM

Awarded
Award Plan FY12

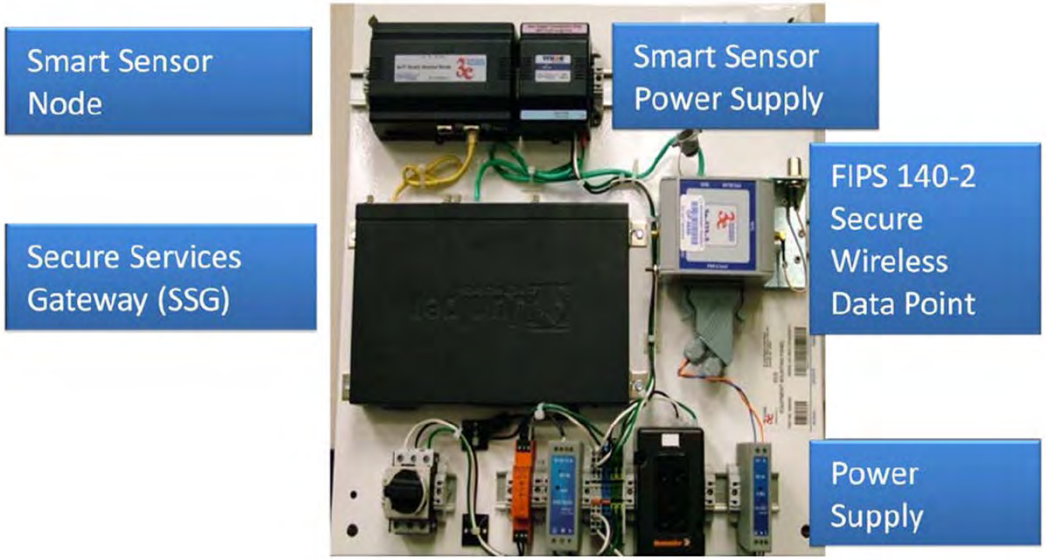
Energy ICT Web Portal



Enterprise Industrial Controls Systems (ICS)

Mission

- Centralized energy monitoring capability integrating DDC & SCADA systems in support of Region Energy Reduction Initiatives
- EICS model scalable for Navy enterprise-wide deployment



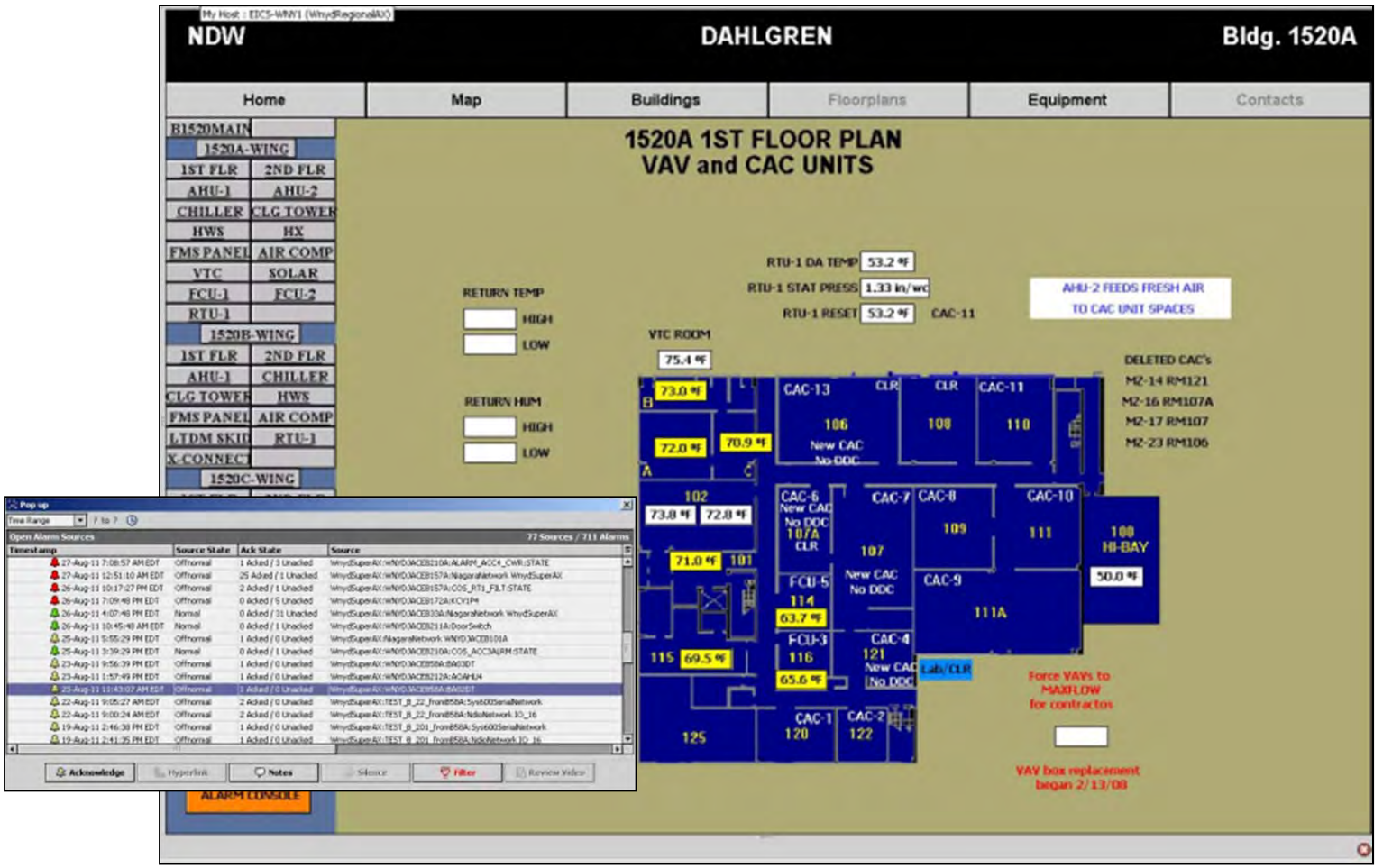
Capabilities

- Integrated EICS solutions
- Critical Infrastructure Monitoring using advanced camera technology

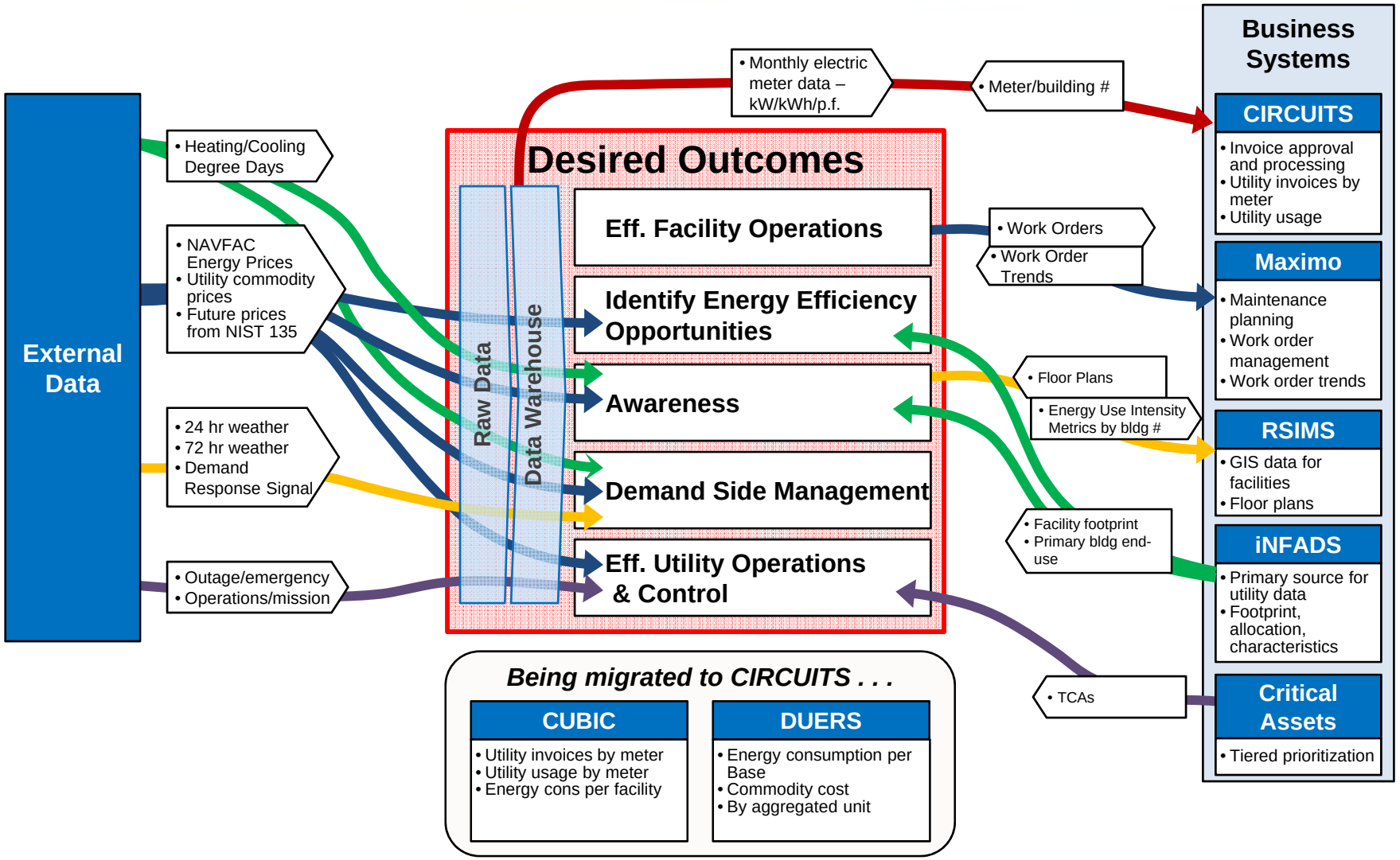
EICS Subsystems

- Wireless Mesh Network
- "PSNET" Network Interface & Firewall
- Networked Programmable Logic Controller (PLC)
- Legacy DDC PLCs and Secondary Controllers
- EICS Management Server & Graphical User Interface

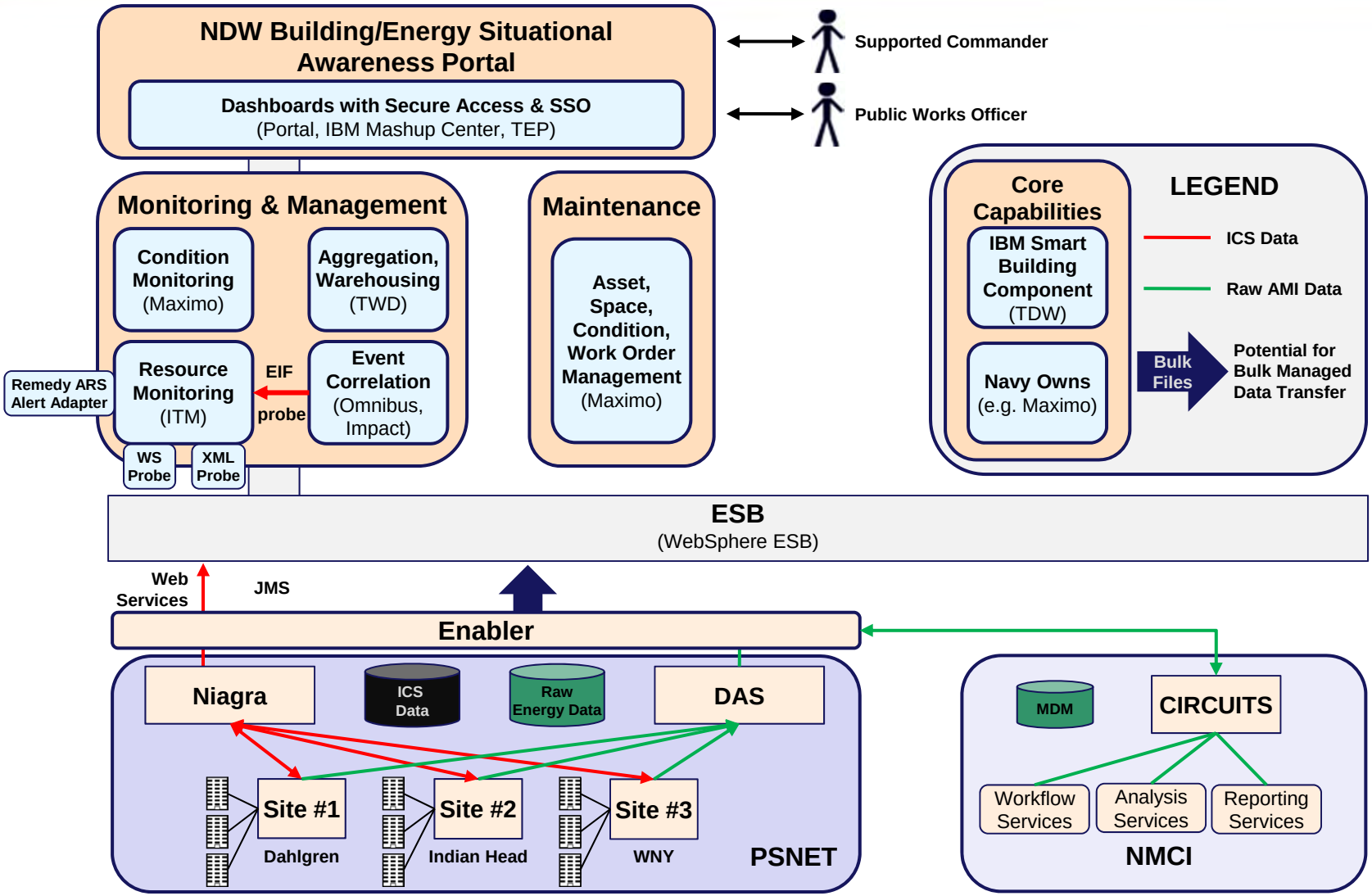
Building Systems



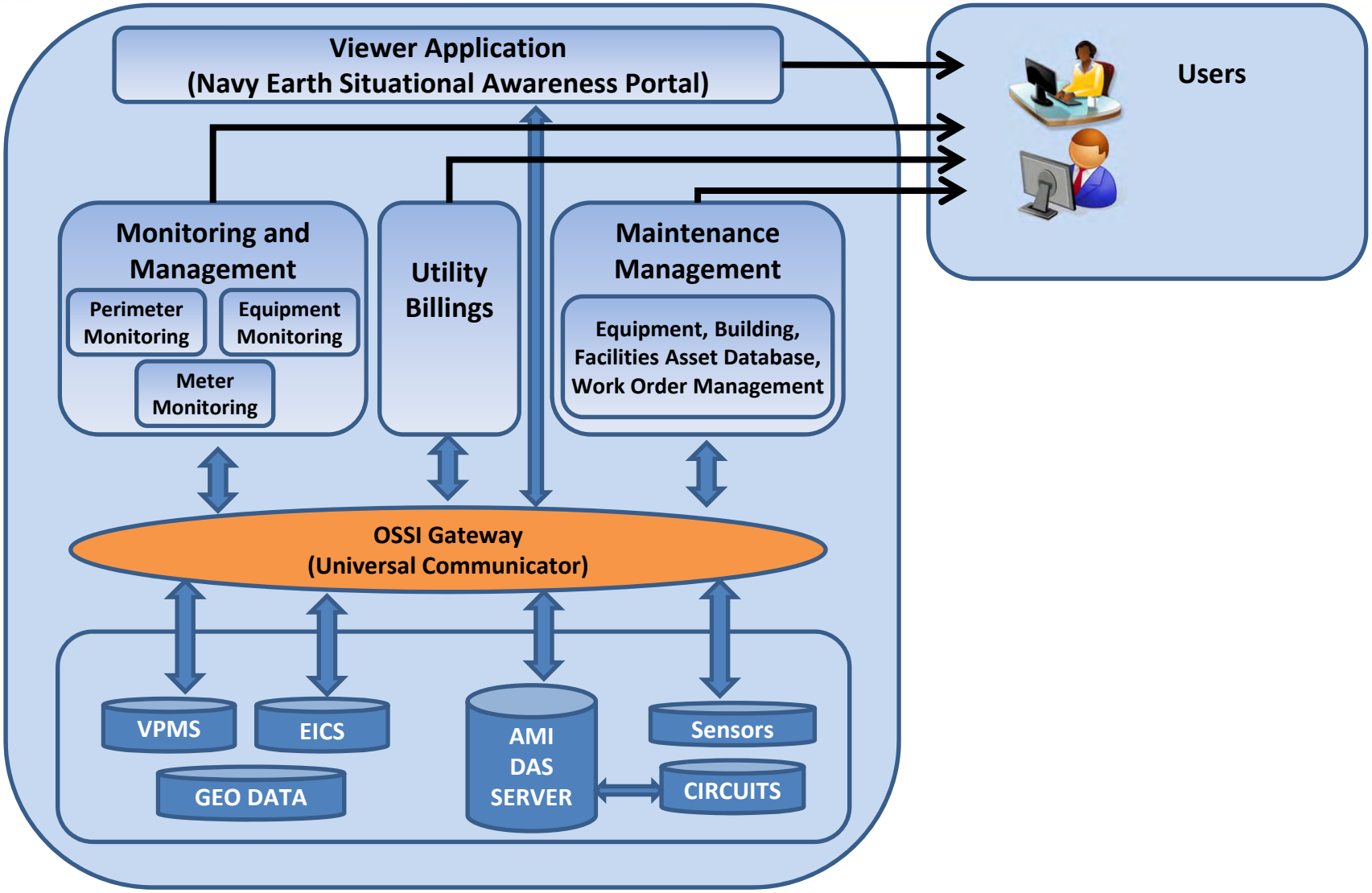
Integration of Smart Energy Management with Business Systems



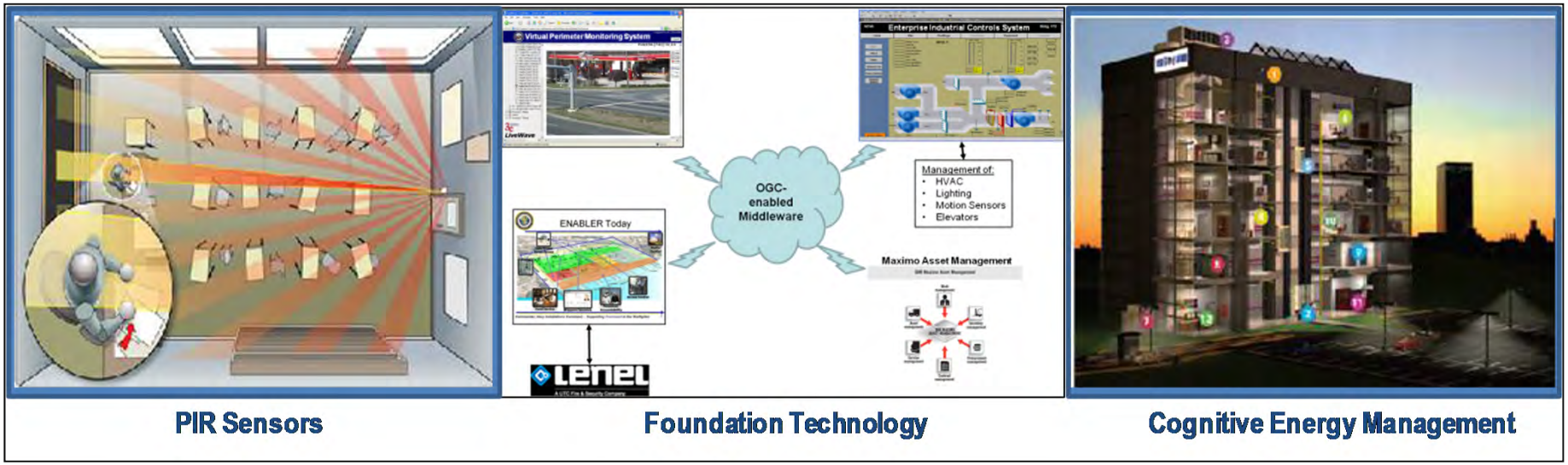
IBM Pilot Architecture



OSSI Pilot Project: System Architecture



Cognitive Energy Management System (CEMS)

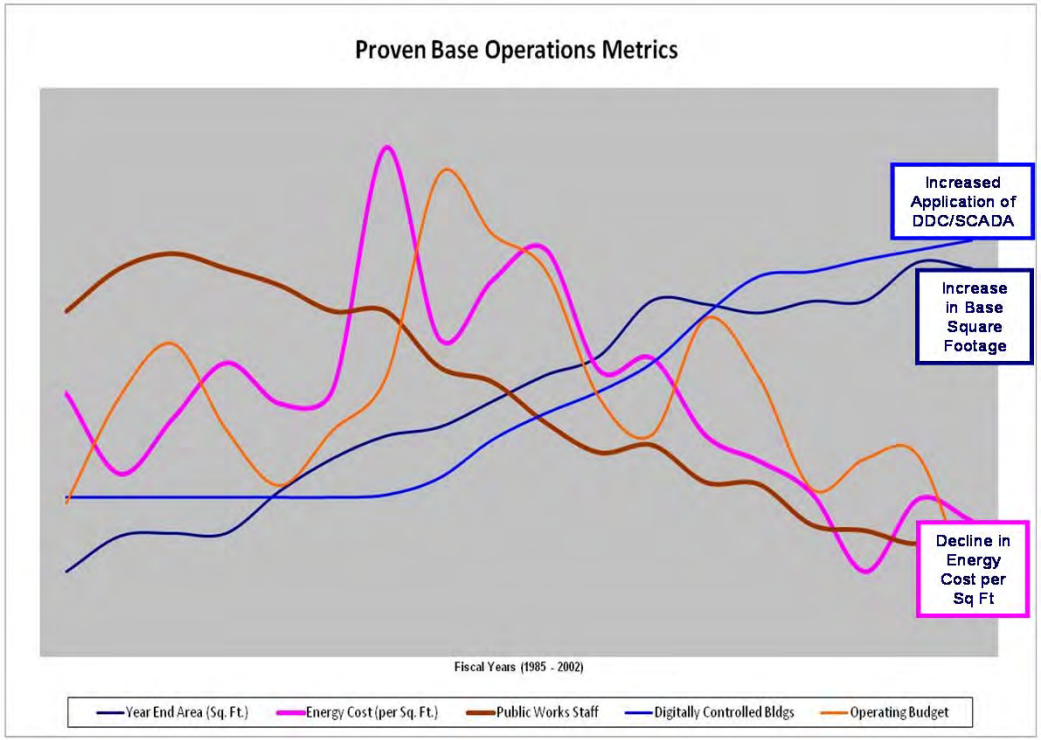


NDW CEMS key elements include PIR Sensors, Video, Access Control, Asset Management, EICS Control, and Cognitive Energy Management

- **Augment standard building automation systems with intelligent control through localized sensors and a person's planned destination based on occupancy**
  - **Distributed sensors – VPMS, Lenel, AMI, PIR, & Motion Sensors**
  - **Controllable integrated building systems – EICS, lighting controls, lighting occupancy sensors, automated building system services**
  - **Asset Management Systems – MAXIMO, GIS, etc.**

CEMS Technical Risks and Objectives

- **Low Technical Risk**
  - **CEMS leverages existing systems with prior Navy validation**
  - **Proven energy consumption reduction metrics**
  - **Underlying systems have IA accreditation**
- **Demonstration Assumptions**
  - **Ability to collect adequate off-hour occupancy data for data analysis**
  - **Ability to install CEMS equipment in selected locations**
  - **Ability to integrate building control systems with CEMS**



- **CEMS is Expected to further NDW's CONOPS Goals of Energy Reduction by demonstrating and piloting additional sensor integration that can be cost effectively implemented in Government Buildings**

NDW SMARTGRID VIDEO